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SURVEY OF Cypripedium calceolus

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BUTTE DISTRICT, GARNET RESOURCE AREA

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Table 1. Sites searched for Cypripedium calceolus in Granite Range

I. SUMMARY

Cypripedium calceolus, a sensitive plant species on the draft Bureau of Land Management sensitive plant list for Montana, was systematically surveyed to document extant populations in the Garnet Resource Area as originally collected from Anderson Hill of the Garnet Range. No extant populations or likely potential habitat were found within a 1 mile radius of Anderson Hill. Potential habitat but no populations were found in adjoining sections. Since this species was known on BLM lands from only Anderson Hill, it is recommended that it be placed in the appropriate category as a potentially extirpated species on the BLM state list, having no management implications within the proposed project area.

II. INTRODUCTION

The Garnet Resource Area Office of the Bureau of Land Management is reviewing mining claim permit renewals on Anderson Hill in the Garnet Range, Granite County, Montana (Figure 1).

Populations of BLM endangered, threatened, or sensitive plants documented from the area are represented by a single historic collection of Cypripedium calceolus collected from the Garnet, Montana area on Anderson Hill by L.A. Merryfield in 1924. This species is ranked as sensitive on the draft list of sensitive plant species by the Bureau of Land Management in Montana (USDI Bureau of Land Management 1991).

Survey work was aimed at relocating the historic record, documenting the population location and habitat needs, to ensure compliance with BLM sensitive species policy. The survey work was conducted May 30, June 11 and June 18 after compiling and reviewing species information and designing a survey method. This final report details survey procedures, background information contributing to survey procedures, survey results, and recommendations.

III. STUDY METHODS

Available background species information was compiled to target the species when it is most conspicuous during peak flowering, in areas of suitable habitat (see species background information section).

Repeated field visits were made to the study area over the course of three weeks, on 30 May, on 11 June by the author and Stephen Shelly, and on 18 June. These dates span the known range of species flowering times in Montana, as reflected by compiled collection information (Heritage database).

There was no habitat information on the specimen label with the original Anderson Hill collection of Cypripedium calceolus to indicate the setting in which it was found. Species habitat information elsewhere in its range was compiled from floras (Dorn 1984, Hitchcock 1978), sensitive species publications (USDA Forest Service 1990), and botanists who have collected and studied it in Montana (S. Shelly, R. Schneider, and M. Mantas pers. commun.). This is typically along wet margins of the Picea engelmannii\Equisetum arvense h.t. Since this habitat is not well-represented in the study area, the survey was extended in scope to all well-developed wetland communities in the immediate vicinity.

Both color and black and white aerial photographs of the area were borrowed from the BLM (1977; flight lines 3-6: frames 22-27; 9x9 prints at a scale of 1 mile = 2 5/8"). The color aerial photo encompassing Anderson Hill, #2-6-24, is reproduced to show the location of the primary wetland sites surveyed near Anderson Hill (Figure 2). Sites identified from aerial photographs included mesic north-facing slopes with forested or meadow seepage communities, wet meadow habitat, and forested stream corridors with varying degrees of

hydric community development.

By this method, nine areas were identified and subsequently searched for Cypripedium calceolus. Four were within a 1 mile radius of Anderson Hill, and five were located to the north (Table 1; Figure 4). In addition, potential habitat was scanned in the course of travels, including First Chance Gulch and Cayuse Gulch, without finding suitable habitat.

IV. BACKGROUND SPECIES INFORMATION

A. CLASSIFICATION

1. **SCIENTIFIC NAME:** Cypripedium calceolus L.

2. **COMMON NAME:** Small yellow lady's-slipper

3. **FAMILY:** Orchidaceae (Orchid Family)

4. **GENUS:** The genus Cypripedium contains thirty-five North American species (Luer 1975). The genus is distributed mainly in temperate and cold regions of North America, Asia and Europe (Luer 1975).

5. **SPECIES:** Cypripedium calceolus is one of four species reported for the genus; the other species include C. fasciculatum, C. montanum and C. passerinum (Dorn 1984).

6. **VARIETY:** Cypripedium calceolus var. parviflorum (Salisb.) Fern. is one of three varieties, the only one known in Montana. It is refered to in Dorn (1984) without the variety distinction. The Anderson Hill specimen was originally identified as Cypripedium calceolus L., and annotated to C. c. var. parviflorum by W. Fertig in 1987. The Anderson Hill specimen had questions noted by Fertig in 1986 whether it might appropriately be called C. c. pubescens, a variety which is reported northward and southward in the Rocky Mountains. While it has the small flower size of C. c. var. calceolus, the perianth appears to be yellowish green as in C. c. var. pubescens rather than reddish brown. Verification of the Anderson Hills specimen by L. Macgrath, an expert on Cypripedium calceolus varieties, is recommended to settle the matter. These varieties are treated as separate species in Kartesz and Kartesz (1985) though regional floristic references for Montana all treat them as varieties.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. **FEDERAL STATUS**

   a. **U.S. FISH AND WILDLIFE SERVICE:** None.

b. **BUREAU OF LAND MANAGEMENT:** Cypripedium calceolus was named as a prospective sensitive plant taxa ("SPT") in the 1991 BLM draft list of sensitive plants, which is currently under review. In light of the 1992 survey work, a designation change for Cypripedium calceolus will be recommended, placing it in the category for possibly extirpated species.

c. U.S. FOREST SERVICE: Cypripedium calceolus is currently included on the list of sensitive plant species for Region 1 (Northern Region) of the U.S. Forest Service, known from the Bitterroot, Flathead, Kootenai and Lewis and Clark National Forests. It is not known but suspected to occur on the Lolo National Forest, which is closest to the Anderson Hill site.

2. **STATE:** Cypripedium calceolus is currently listed by the Montana Natural Heritage Program (1992) as restricted and vulnerable but recurrent in the state (state rank = S2S3). This is based on 34 records from 10 counties (including the Anderson Hill record). Some of the records represent large populations. The current rank was lowered from S2 despite the apparent loss of the Anderson Hill population, the only known case of extirpation.

C. DESCRIPTION

1. **GENERAL NONTECHNICAL DESCRIPTION:** Cypripedium calceolus is a showy dainty perennial herb that grows 6-16 inches tall (Figure 3). The lower lip petal is a distinctive yellow pouch ("slipper") with an opening in the upper surface. It is often purple-speckled, and is less than 2 inches long for C. c. var. parviflorum. The other petal-like parts of the flower (petals + sepals) are long and narrow. They are glossy deep red to yellowish green, with or without mottling, as described in Hitchcock and Cronquist (1984). The solitary yellow flowers of this species are subtended by an erect leafy bract which appears much like the elliptic stem leaves. The stem leaves are 2-7 inches long and barely sheath the stem. The stems grow singly or more often in clumps with many stems. The foliage is lightly pubescent and usually glandular. The fruit is an elliptic capule bearing many thousands of tiny seeds. In Montana, the plants are generally in flower from late May to early June, but the Anderson Hill specimen was in full flower late on 25 June 1924. This might be explained by the fact that the Anderson Hill site is over 1500 feet higher in elevation than other known Montana sites.

2. **TECHNICAL DESCRIPTION:** Stems 1.5-4 dm tall, sparsely

pubescent and more of less glandular, leafy throughout; leaves mostly slightly sheathing, broadly elliptic to elliptic-lanceolate, 6-17 cm long, up to 7 cm. broad, lightly pubescent and usually glandular; flowers 1 (very occasionally 2), subtended and usually exceeded by an erect, leaflike bract; sepals and petals greenish-yellow to somewhat purplish brown or purplish-mottled, usally wavy-margined and slightly twisted, the upper sepal broadest, 2.5-4 cm. long, the lower pair completely fused or with only a notch at their tip; petals somewhat narrower and longer than the sepals, up to 4.5 cm long, lip 2-3 cm long, strongly pouched, yellow, often purplish dotted around the orifice; staminoidium triangular, usually lobed or auriculate at the base, up to 10 mm long, yellow with purple dots (taken from Hitchcock and Cronquist 1984).

3. **LOCAL FIELD CHARACTERS:** Of the four species of Cypripedium reported for Montana, only C. calceolus has a yellow lip petal. The range of C. montanum overlaps with C. calceolus in Granite County, though the former was not found on Anderson Hill. The C. montanum has a white lip petal and lacks the mottling on the lip aften found in C. calceolus. It also occupies drier upland habitats. Vegetatively, the broadly elliptic C. calceolus leaves resemble leaves of Veratrum viride except that the leaves are flat rather than pleated.

D. **GEOGRAPHICAL DISTRIBUTION**

1. **RANGE:** Cypripedium calceolus is a circumboreal species, distributed across Europe and northeastern North America, extending westward as far as British Columbia, Washington and Oregon east of the Cascades, east to Montana, Idaho, Wyoming and Colorado. Hitchcock (1978) treats all the material of the Pacific Northwest as Cypripedium calceolus var. parviflorum. However, Macgrath (1973) treats British Columbia and Colorado material as C. c. pubescens.

   It occurs in northwest counties of Montana, with the nearest record being from Missoula County. Only three collection records are further south, and all are historic. They are from Gallatin and Stillwater counties.

2. **CURRENT SITES:** Thirty recent records are in the Montana Natural Heritage Program database, documented from seven counties.

3. **HISTORICAL SITES:** The Garnet collection represents the third collection of Cypripedium calceolus in the state. In addition, there are four other records among the thirtyfour records which pre-date the 1950's. They have vague

collection location descriptions, and have not been relocated. These include:

Flathead Co. 1895. "Columbia Falls"
Gallatin Co. 1897. "Salesville"
Gallatin Co. 1936. "15 miles north of Belgrade"
Stillwater Co. 1937. "Nye, MT; riverbottom"

4. **UNVERIFIED/UNDOCUMENTED REPORTS:** None.

E. HABITAT

1. **ASSOCIATED VEGETATION:** The most common plant association in which Cypripedium calceolus is found is the Picea engelmannii / Equisetum arvense h.t. Often the species is restricted to the lower wet margin of this type grading into wetland or riparian habitat. Many sites for the species have a major deciduous canopy component including the following trees:

Populus tremuloides	Quaking aspen
Betula papyrifera	Paper birch

Forest understory species associates include:

Cornus canadensis	Bunchberry
Linnaea borealis	Twinflower
Clintonia uniflora	Queen's cup

Shrub cover varies and is often the local ecotone or wetland community dominant, including species like:

Cornus stolonifera	Red osier dogwood
Betula glandulosa	Bog birch
Salix bebbiana	Bebb's willow
Acer glabrum	Rocky Mountain maple
Alnus incana	Alder

Among the other wetland plants with which it may be associated are the following herbaceous species:

Carex leptalea	a sedge
Carex interior	a sedge
Senecio pseudoaureus	a groundsel
Calamagrostis canadensis	bluejoint

Atypical examples of Cyprepedium calceolus habitat include an Abies grandis \ Clintonia uniflora h.t., a Pseudotsuga menziesii association with Populus tremuloides, and a willow thicket opening.

2. **TOPOGRAPHY:** Cypripedium calceolus is consistently found in

sheltered wet habitats, which are generally situated low on the landscape gradients.

The species occurs at 2720-4700 ft elevation elsewhere in Montana, 1500 feet lower than the Anderson Hill site (elevation 6200 feet).

3. **SOIL RELATIONSHIPS:** The known sites of C. calceolus in Montana occur on Alfisol soil profiles with high organic content and proximity to the water table commonly associated with stable groundwater discharge zones. The soils are derived from variable parent material, including limestone and dolomite of the Madison Group or fine-grained metamorphic rock of the Belt Supergroup, often in combination with glacial or fluvial deposits overlying less permeable strata. The most important feature of all known sites may be the stable subsurface moisture.

4. **REGIONAL CLIMATE:** The climate of western Montana west of the Continental Divide can generally be classified as moist and temperate. For the Anderson Hill area, the nearest climatological stations are located at the Phillipsburg Ranger Station of the Deerlodge National Forest over 40 miles to the south at a lower elevation, and at Missoula about 60 miles west. Data for the period 1951-1980 are provided by the U.S. Department of Commerce (1982). At the Phillipsburg site, the mean annual precipitation was 14.22 inches, the mean annual temperature was 40.8 F, the mean January minimum was 11.5 F, and the mean July maximum was 80.5 F. At Missoula, the mean annual precipitation was 13.29 inches, the mean annual temperature was 44.1 F, the mean January minimum was 13.7 F,and the mean July maximum was 84.8 F.

F. POPULATION BIOLOGY

1. **PHENOLOGY:** Peak flowering for Cypripedium calceolus in Montana is usually in late May to early June, but the Anderson Hill specimen was collected in full flower on 24 June 1924. Flowering duration is less than two weeks. Either climatic conditions in 1924 were unusual so as to delay flowering, or the Anderson Hill setting is different enough from other Montana settings for the species to have a late flowering period. The higher elevation of the Anderson Hill site compared to other collection sites may also account for delayed phenology.

2. **POPULATION SIZE AND CONDITION:** Vegetative reproduction of C. calceolus results in multiple stems from the same rootstock, making it difficult to meaningfully estimate the number of distinct individuals in the field. Estimates or exact counts of the number of stems have been noted by botanists

inventorying the species. A clump of 1-20 flowering (genet) or non-flowering stems (ramet) may actually represent one individual, so that stem counts are high approximations of population size. Estimates range from 1-1000 stems; about half of the 30 recent records had stem tallies of around 100 or less.

3. **REPRODUCTIVE BIOLOGY**

a. **TYPE OF REPRODUCTION:** Both vegetative and sexual reproduction are known for Cypripedium spp. The fibrous rhizhome produces buds annually which develop into separate stems. A single clone can produce anywhere from one to over twenty stems. The clumped distribution patterns of this species generally reflect clone development.

b. **POLLINATION BIOLOGY:** Most orchids are insect-pollinated. The Orchid Family is adapted for insect-pollination in that the pollen on the anthers is packaged into masses with a sticky disk, called "pollinia". When visiting insects come into contact with the adhesive part of the pollinia, it adheres to the insect for transportation to other flowers. Flowers which are not visited by insects can still be wind-pollinated with dessication of the anther and the connecting disk. Native bees are the likely pollinator for this species (Luer 1975).

c. **SEED DISPERSAL AND BIOLOGY:** The flowers of species in the Orchid Family produce microscopic seed which are difficult to establish because they lack seed reserves and require a mycorrhizal symbiont.

V. RESULTS AND DISCUSSION

Efforts to relocate Cypripedium calceolus in the Garnet Range were unsuccessful. There are three possible explanations for the result.

There is no basis for suspecting the label data with the original specimen to give an incorrect location. Both the townsite of Garnet and the nearby Anderson Hill landmark are named.

It is improbable but possible that potential habitat remains but was overlooked on both aerial photographs and ground reconnaissance. At other sites of C. calceolus, it occurs in undisturbed bottomland settings at forest/wetland borders, a combination of site features which will are usually of sufficient size and contrast to discern.

The most likely explanation for the survey result is extirpation of the species at the Anderson Hill site. Lowerslope clearcuts on the

North flanks of Anderson Hill signify potential habitat with the highest probability of havinig had stable wet environments.

The Anderson Hill record represents a state significant range extension of the species in terms of elevation. It also presents a need to review the variety nomenclature as applied in Montana. The specimen will be sent off for verification as C. c. var. parviflorum, with the cooperation of the University of Montana Herbarium, to confirm the correct identification to variety of the original specimen. Annotation information will be conveyed to the Bureau of Land Management, and information on the species will continue to be maintained and pursued by the state under the current state rank.

VI. RECOMMENDATIONS

Further survey work for Cypripedium calceolus is not warranted within the Anderson Hill area, barring unlikely discovery of intact habitat too small to discern on aerial photos.

Status of Cypripedium calceolus belongs in the category of species which are potentially extirpated on BLM-administered lands and which warrant conservation protection if found elsewhere in the future.

IV. LITERATURE CITED

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Figure 1. Map of the Anderson Hill study area

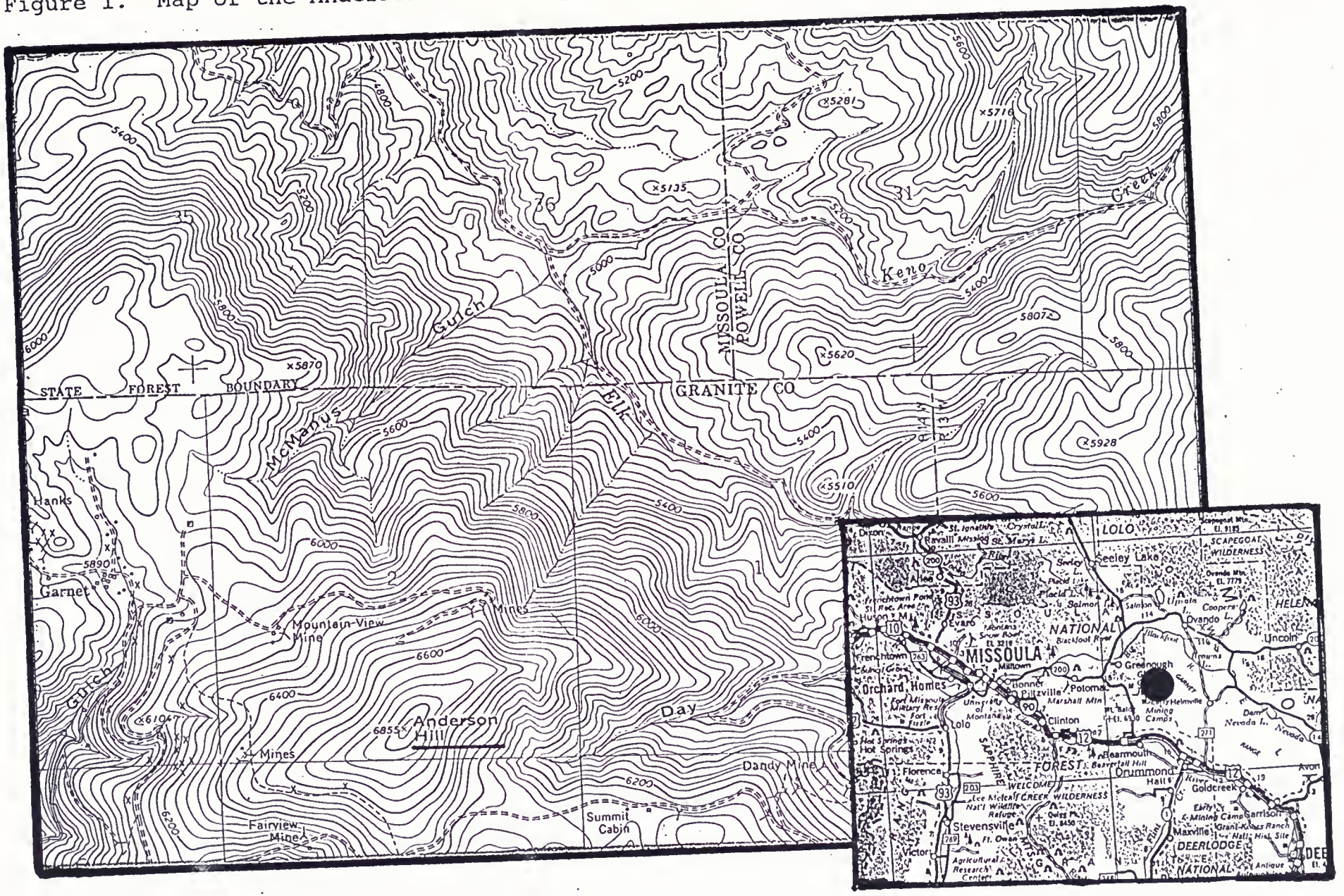


Figure 2. Aerial photograph showing potential habitat around Anderson Hill

Figure 4. Photograph of Cypripedium calceolus

Figure 1. Map of the Anderson Hill study area

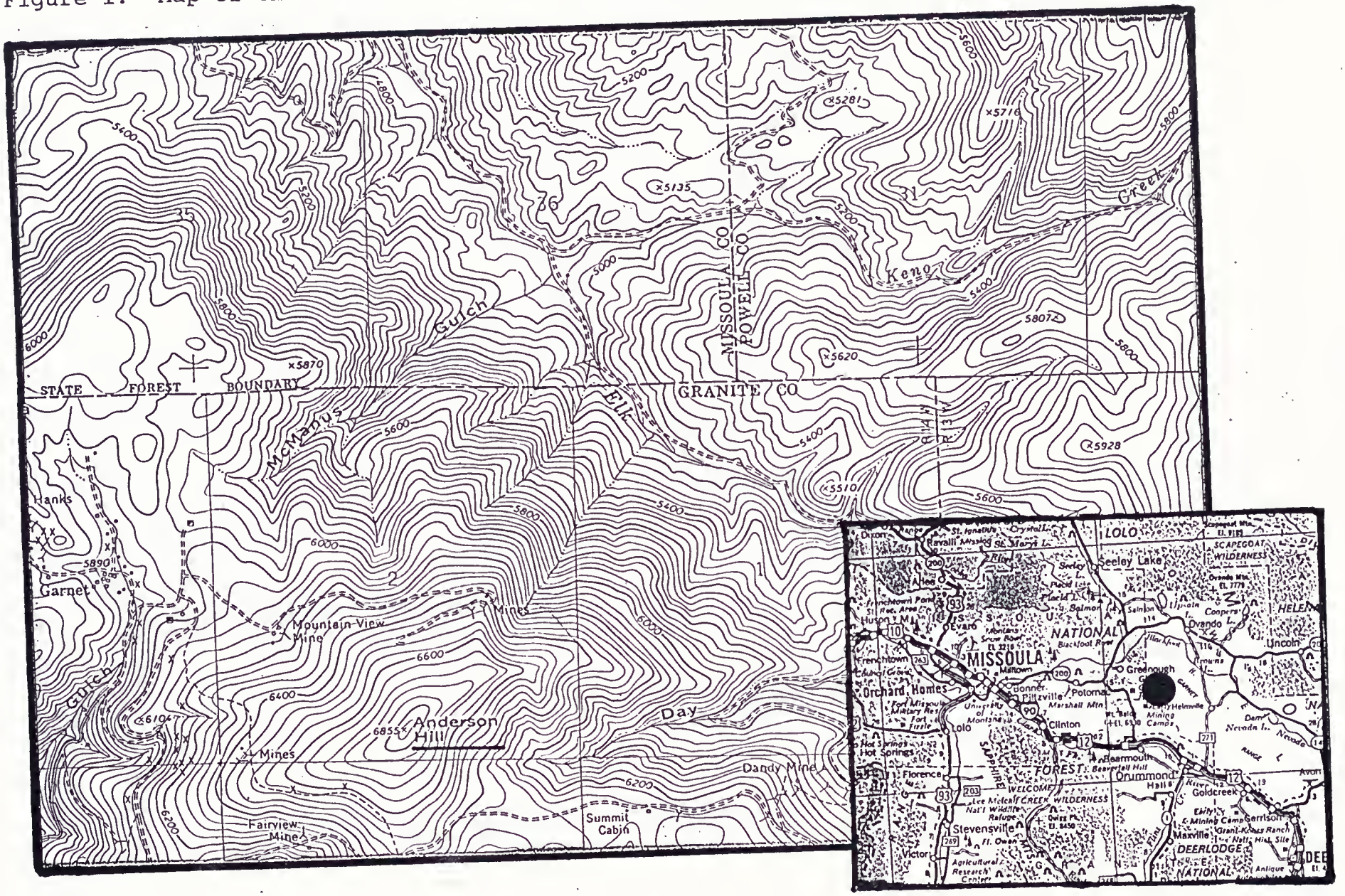


Figure 3. Location of intensively surveyed sites

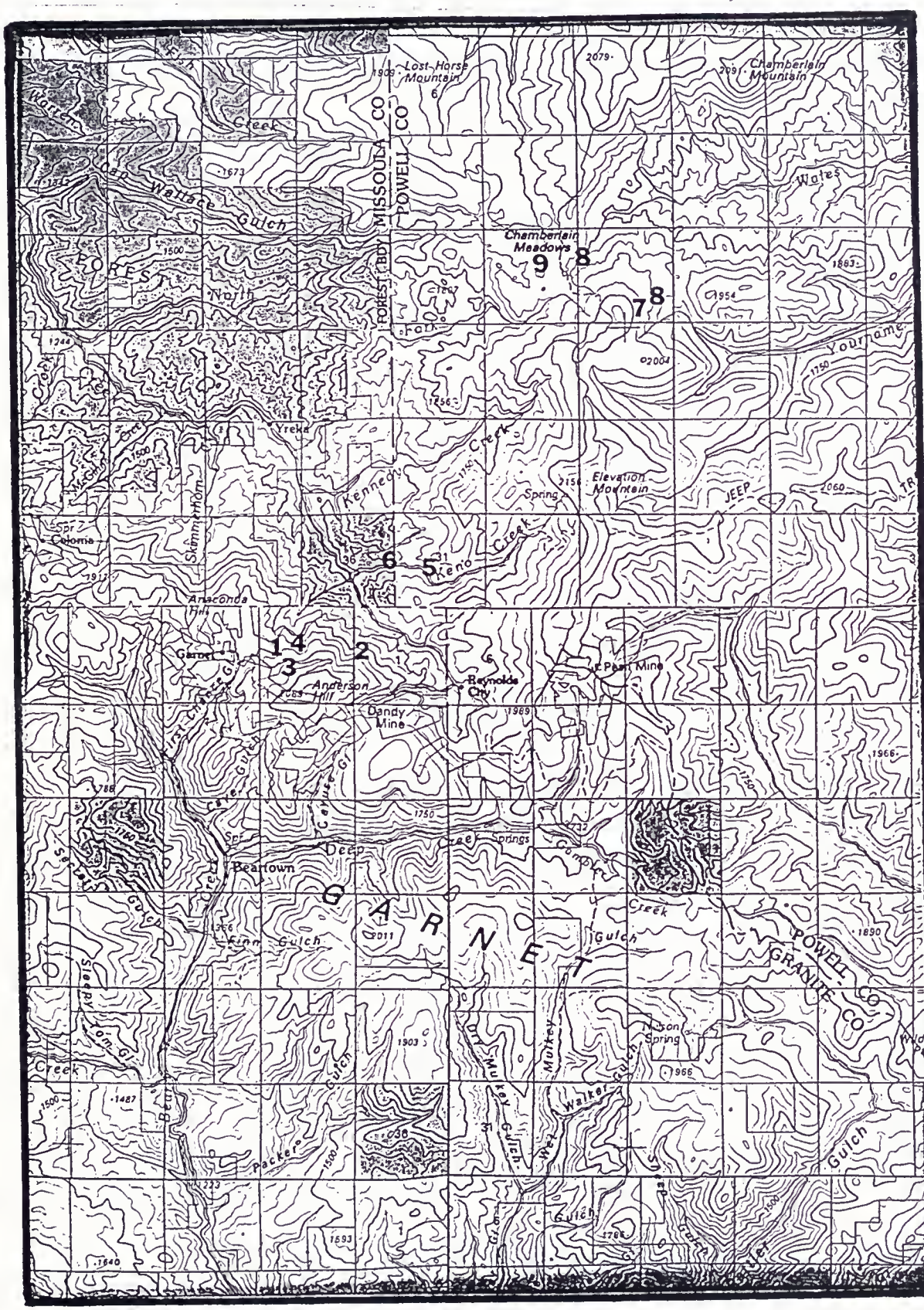


Figure 4. Photograph of Cypripedium calceolus

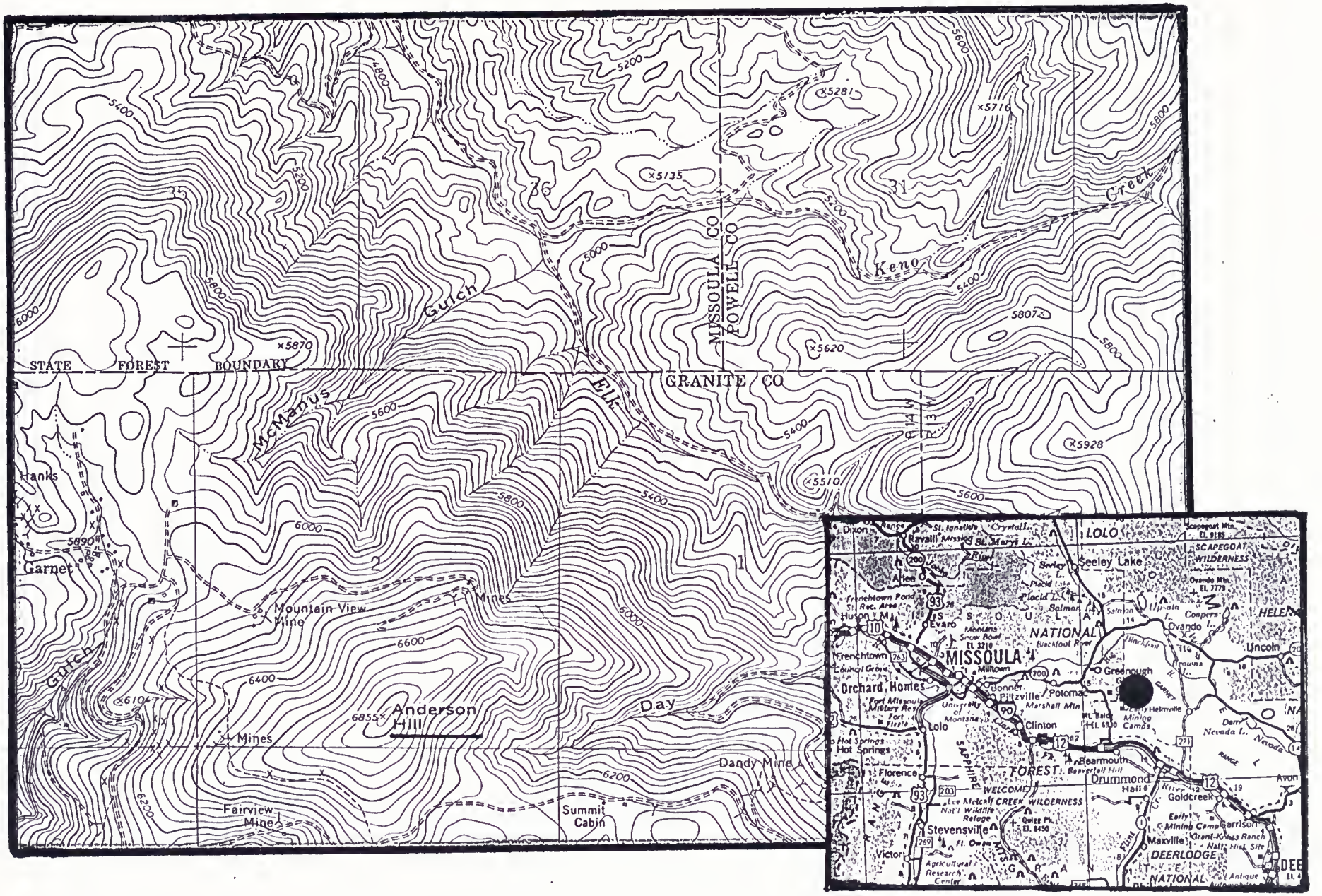
Table 1. Sites searched for Cypripedium calceolus in Granite County

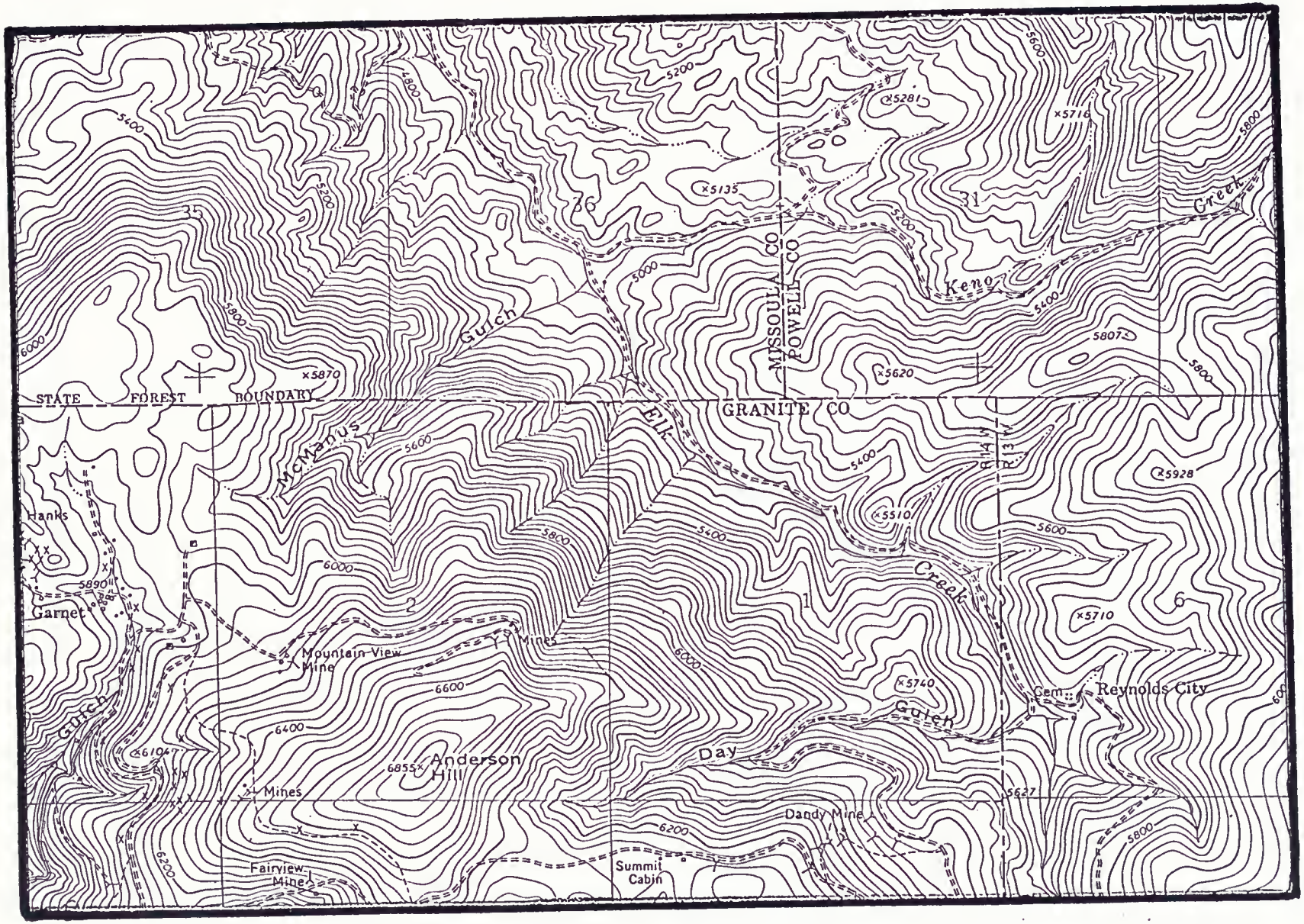
	Site location*	Habitat
1	McManus Gulch* T12N R14W Sec. 2 SW/NW Elevation Mtn Quad	Moist north-trending watercourse midslope on Anderson Hill
2	Meadow seep* T12N R14W Sec. 1 SW/NW	Moist steep north-facing meadow opening overlying loose talus
3	Sluiceway stream* T12N R14W Sec. 2 NW/SW	Headwaters of stream above abandoned mine; tributary of McManus Gulch watercourse
4	Spruce forest slope* T12N R14W Sec. 2 SE/NW	Most mesic of spruce forest habitat on Anderson Hill, with semi-saturated soil in spring
5	Keno Creek tributary T13N R13W Sec. 31 SE/NW	Broad wet bottomland
6	Kennedy Creek tributary T13N R14W Sec. 36 SE/NE	Narrow wet bottomland
7	Wales Creek willow slope Chamberlain Mtn Quad	North-faciing slopes locally dominated by Salix bebbiana
8	Wales Creek spruce seeps T13N R13W Sec. 15 T13N R13W Sec. 16 NW Bata Mtn Quad	Base of north-facing slopes with surface groundwater discharge in spring
9	Chamberlain Meadows T13N R13W Sec. 17	Extensive wet meadow complex located at stream headwaters, influenced by high water table and fire history

* Within 1 mile radius of Anderson Hill
Field survey write-ups are submitted separate from this report

Figure 3. Location of intensively surveyed sites

Figure 1. Map of the Anderson Hill study area

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POWELL CO
GRANITE CO
McManus Gulch
Elk Creek
Keno Creek
Day Gulch
Hanks
Garnet
Mountain View Mine
Mines
Anderson Hill
Mines
Fairview Mine
Summit Cabin
Dandy Mine
Gem
Reynolds City
R14W
R13W
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